

1451867

BIRGE POND DAM

CT 00007

CONNECTICUT RIVER BASIN
BRISTOL, CONNECTICUT

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

37 Brookside Road • Waterbury, Conn. 06708 • Tel. 203 753-9800

July 18, 1980

The Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Attention: E. P. Gould
Project Management Division

Re: Birge Pond Dam
Bristol, Connecticut

Gentlemen:

Following field surveys and a dam failure analysis of Birge Pond Dam, we conclude that the dam should be reclassified as having a low hazard potential.

We are enclosing a brief letter report substantiating our findings.

Very truly yours,

ROALD HAESTAD, INC.

By


Roald Haestad



RH:cft
Encl.

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DESCRIPTION

BIRGE POND DAM
CT 00007
CITY OF BRISTOL, COUNTY OF HARTFORD
ON BIRGE POND BROOK
OWNED AND OPERATED BY THE CITY OF BRISTOL

The Birge Pond Dam consists of an earth embankment with a top width of 15 feet, a maximum height of 16 feet, an upstream slope of 2.5 horizontal to 1 vertical, and a downstream slope of 2.6 horizontal to 1 vertical. There are numerous trees growing from the upstream and downstream slopes of the embankment. The dam is 320 feet long, including a 57.3 foot long concrete overflow spillway located near the left end of the dam. The spillway was reportedly formed by constructing a reinforced concrete slab over the top of an existing earth and timber cribbing dam. The outlet works located at the left end of the dam consist of an upstream gatehouse and unknown piping which formerly supplied water to a downstream manufacturing plant.

The dam appears to be in fair condition and requires some work.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

The Birge Pond Dam has a tributary watershed of 1.44 square miles, a water surface area of 11 acres, a storage capacity of 105 Acre-Feet and a hydraulic height of 16 feet with the water level at the top of the dam. In accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Birge Pond Dam is classified as "Small" in size based on storage capacity.

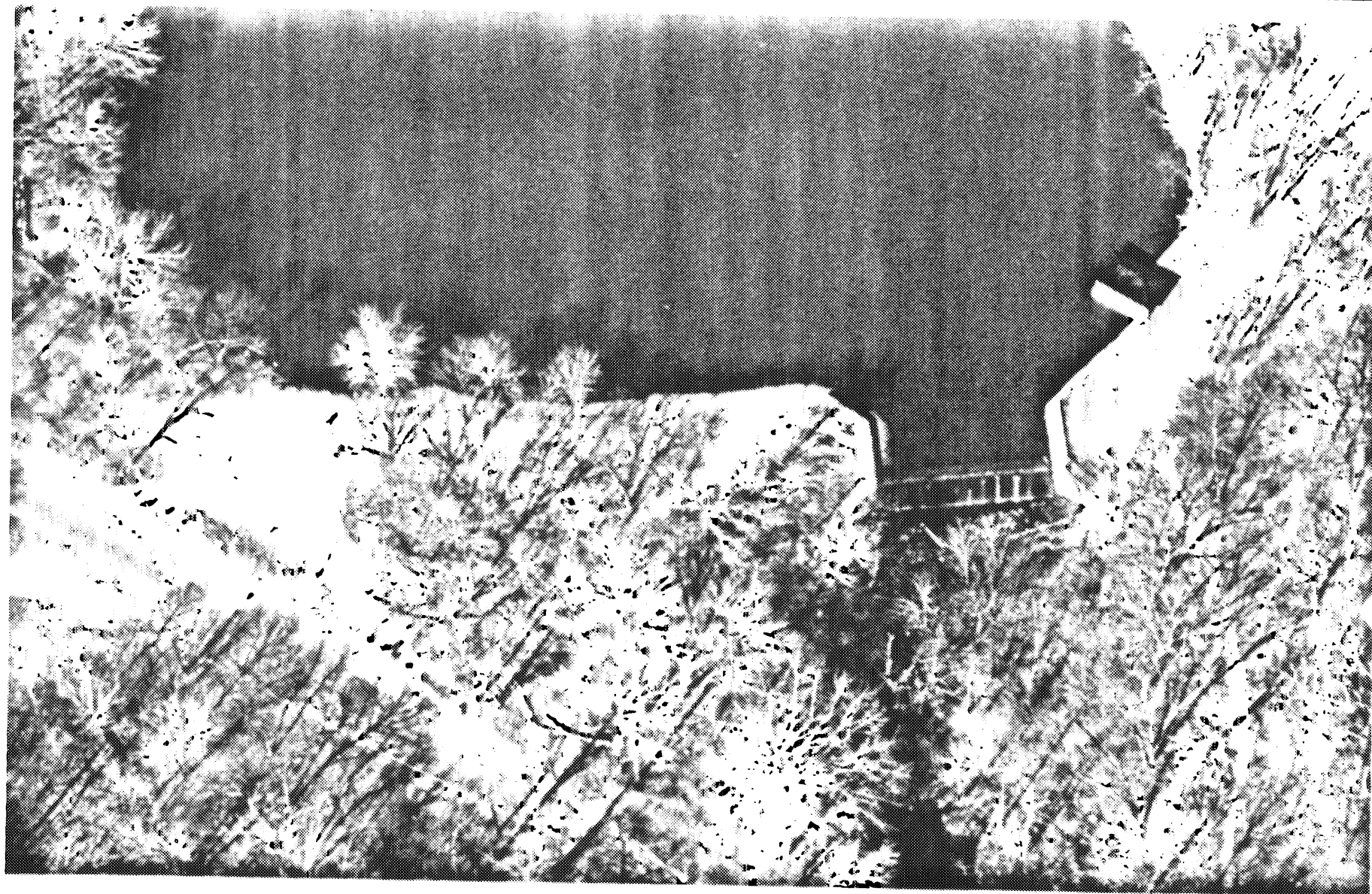
No plans or design data were available. An inspection report prepared by Clarence Blair Associates on March 20, 1963, is included in Appendix A.

A dam breach analysis was made using the Corps of Engineers' "Rule of Thumb" guidance for estimating downstream dam failure hydrographs. Failure was assumed with the water level at the top of the dam. The peak discharge from the dam breach was calculated to be 5,700 cfs.

The flood waters would travel 800 feet downstream to a railroad embankment. The embankment would restrict the flood flows and cause substantial ponding. The discharge through the railroad embankment would be controlled by a 7-foot diameter stone masonry culvert. Flood routing calculations at the railroad embankment indicate the water surface elevation after dam breach would be approximately at Elevation 385, equal to spillway level. The top of the railroad embankment is about Elevation 400. The maximum outflow from the culvert, with the water level at Elevation 385, would be about 700 cfs.

Downstream culverts have a capacity of 1080 cfs according to the Bristol City Engineer. The roadway approximately 200 feet downstream of the dam would be inundated by 15 feet of water and possibly washed out. It is doubtful the railroad embankment would be damaged as a result of the dam breach.

No homes are located within the potential limits of a dam breach flood, therefore, the loss of any lives is unlikely. The dam is classified as "Low" Hazard Potential in accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams.



OVERVIEW PHOTO

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

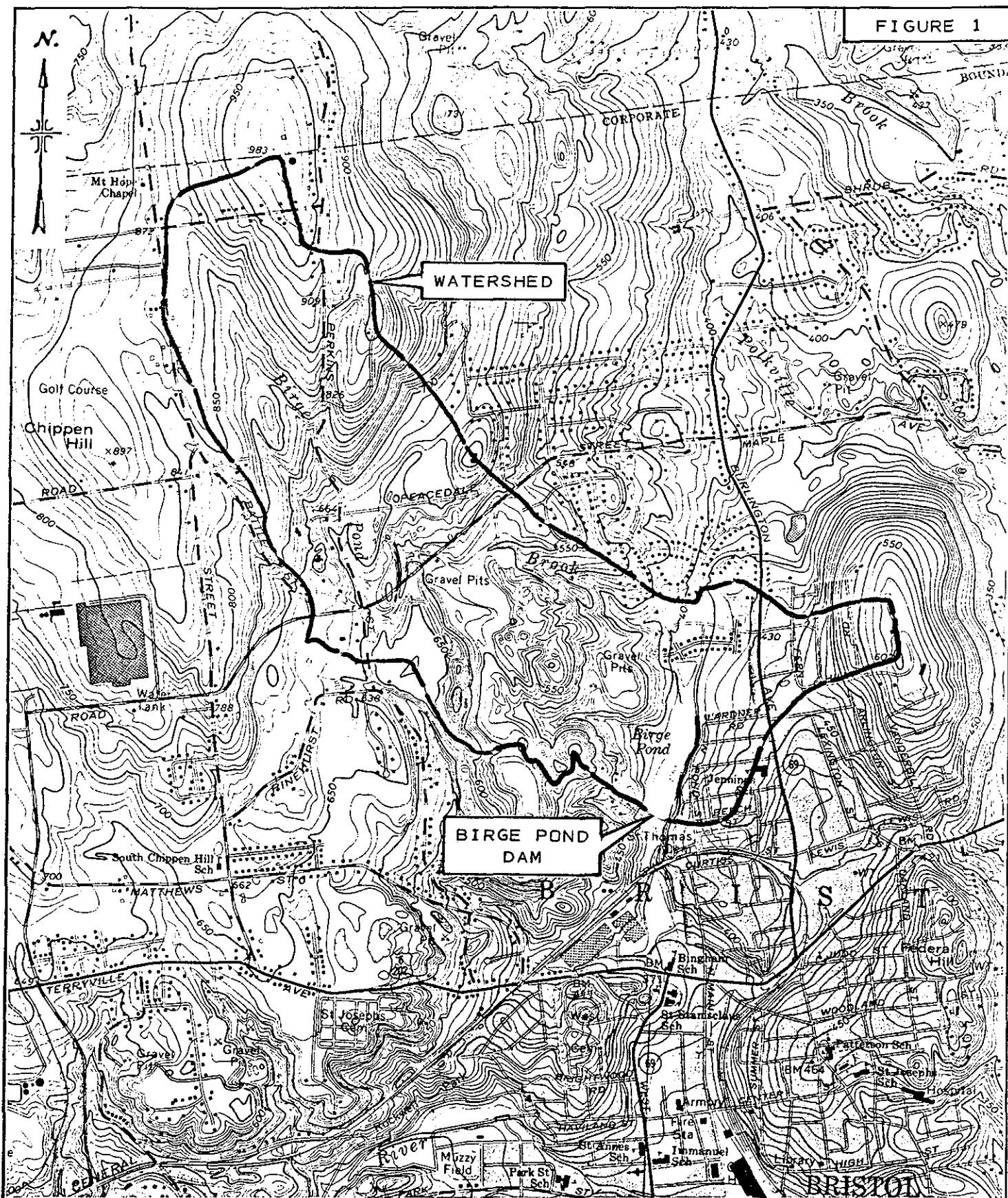
NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

BIRGE POND DAM - CT 00007

BIRGE POND BROOK

BRISTOL, CONNECTICUT

DATE: 19 APRIL '80



LOCATION PLAN

BIRGE POND DAM
BRISTOL, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC.

BRISTOL QUADRANGLE 1972

Appendix A
Engineering Data

CLARENCE BLAIR ASSOCIATES, INC.

Civil Engineers

ROGER C. BROWN
JAMES C. BEACH
FRANK RAGAINI

CHARLES E. AUGUR, JR.
GORDON BILIDES
JOHN M. BREST
DONALD L. DISBROW
NICHOLAS PIPERAS, JR.

P. O. BOX 236 SPRUCE 7-7379
93 WHITNEY AVENUE — NEW HAVEN, CONN.

WATER SUPPLY
SEWAGE DISPOSAL
WASTE DISPOSAL
SURVEYS
LAND DEVELOPMENT

March 20, 1963

State Water Resources Commission
650 Main Street
Hartford 15, Connecticut.

Re: Birge Pond Dam
Bristol, Connecticut

Attention Mr. Emitt A. Dell.

Gentlemen:

At your request I made an inspection of the subject dam on March 15, 1963 accompanied by Mr. Vernon C. Geckler, Plant Engineer.

The dam is owned by the New Departure Division of General Motors Corporation and furnishes process and cooling water to their North Side Plant. It is located on Birge Pond Brook on the northerly outskirts of the City of Bristol. The dam consists of an earth embankment and a concrete spillway section, the total length being about 400 feet.

The tributary drainage as measured on the U.S.C.G.S. map is 920 acres or 1.4 square miles.

The water surface area of the pond is about 13 acres. The storage capacity, according to a contour map made in 1937, was 20 million gallons at that time. Plans, dated 1933, were on file showing the construction of the dam in its present form. The overflow-section was formed by construction of a reinforced concrete slab over the top of an existing earth and timber cribbing dam. According to the plans the overflow section is 12.5 feet high from crest to apron and is 60 feet long. The spillway abutment walls are of concrete with the top of the walls 5 feet above the crest of the spillway. The top of embankment is shown on the plans at an elevation of 4.3' above the spillway crest.

Inspection of the dam itself shows it to be in good condition. Concrete in the spillway section and abutment walls show no evidence of cracks or deterioration. The embankment forming the westerly end of the dam is for the most part in good shape. At its extreme westerly end the top of the embankment is narrow and in some spots low. It is recommended that this section of embankment be brought up to the height and width of the remainder of the embankment by the placing of thoroughly compacted fill.

State Water Resources Commission
Hartford Connecticut

March 20, 1963

Some fairly good sized trees and one very large one are growing from the embankment. Trees are a hazard to an earth dam because of the possibility of their being uprooted during a storm and causing a weak spot in the embankment. It is recommended that all trees be removed from the top and downstream slope of the embankment.

A slight amount of water was observed emerging from the back side of the downstream end of the west abutment wall. Because of the fact that there was snow on the ground at the time of the inspection it was difficult to tell whether or not some of this water might be from melting snow. It was my opinion, however, that this water was leakage through the dam. In any case the amount of water involved is not great and constitutes no hazard at this time. It would be well to check this seepage during dry weather. It would also be well to observe it periodically to note if the flow has a tendency to increase.

The spillway capacity of the dam appears to be satisfactory provided that the top of embankment is maintained at the elevation shown on the plans which is 4.3' above the spillway crest. This depth provides a spillway capacity of 1000 cubic feet per second per square mile of drainage area.

About 800 feet below the dam the stream flows through a culvert under a railroad embankment estimated to be 50 feet in height. In case of failure of the Birge Pond Dam, this railroad embankment would restrain the resulting flood, the flow below the embankment being limited to the capacity of the culvert.

As a result of my investigation and inspection it is my opinion that the Birge Pond Dam is in good condition, has satisfactory spillway capacity, and presents no hazard from failure.

I would recommend that the following precautionary measures be taken:

1. Remove all trees from the top and downstream slope of the earth embankment.
2. Restore the embankment at the westerly end of the dam to a height and width equal to the original construction.
3. Observe periodically the seepage at the end of the west wing wall to determine if the volume tends to increase.

Very truly yours

Roger C. Brown
Roger C. Brown

RCB: efk

Appendix B

Photographs

Note: For Photo Locations,
see Figure 2,
Appendix A

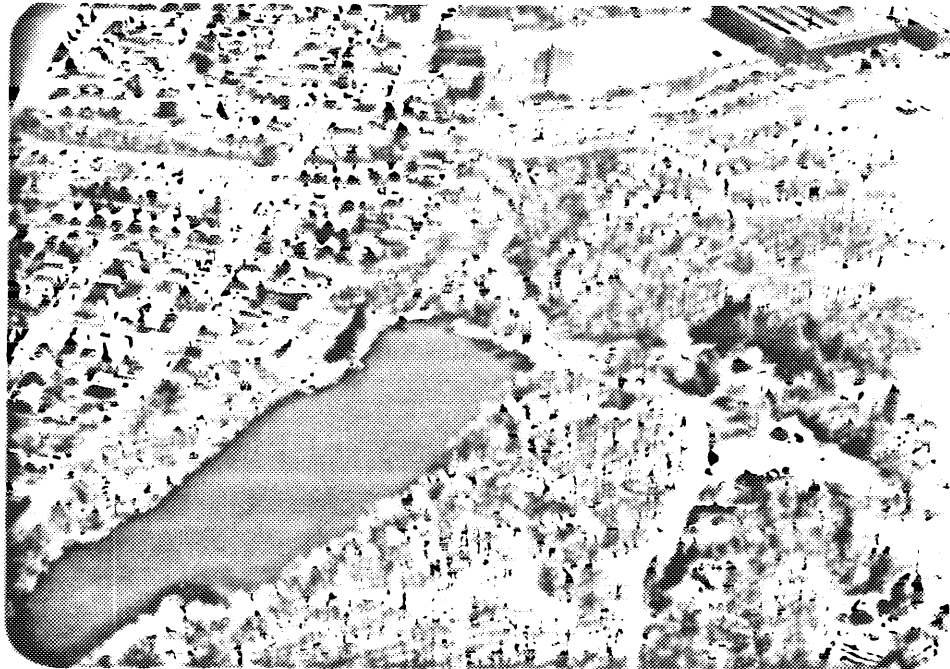


PHOTO NO. 1

OVERVIEW OF DAM
NOTE RAILROAD EMBANKMENT
DOWNSTREAM OF DAM.

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CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

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CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

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BIRGE POND DAM
BIRGE POND BROOK
BRISTOL, CONNECTICUT
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19 APRIL '80



PHOTO NO. 2

DAM CREST FROM SPILLWAY.
NOTE TREES ON UPSTREAM AND DOWNSTREAM SLOPES
AND THE LACK OF UPSTREAM SLOPE PROTECTION



PHOTO NO. 3

SEEPAGE AREA NEAR TOE OF DAM

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PHOTO NO. 4

SPILLWAY FROM DOWNSTREAM

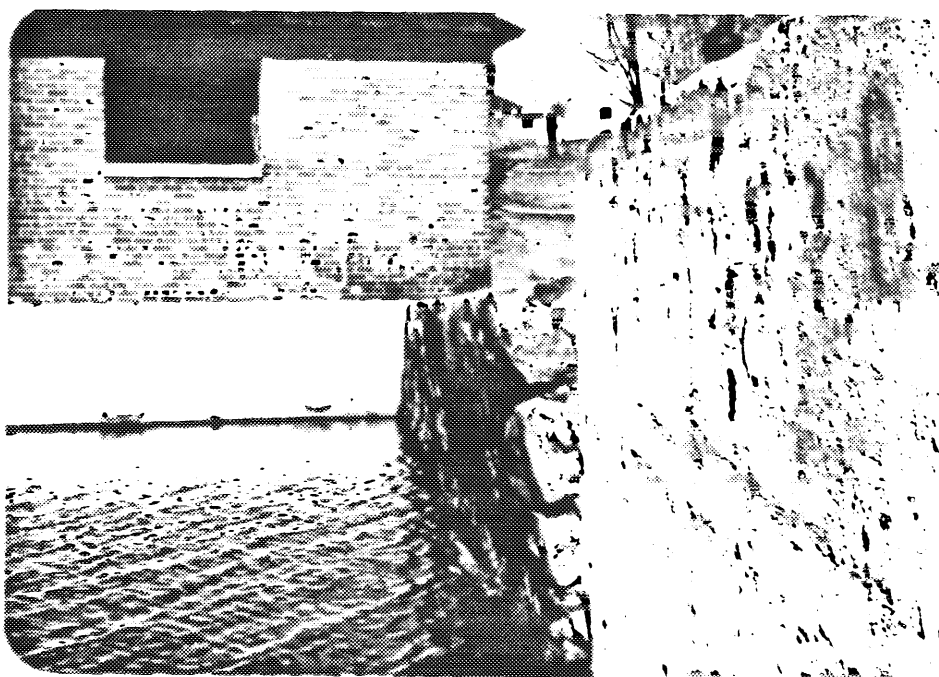


PHOTO NO. 5

STONE MASONRY WALL BETWEEN GATEHOUSE
AND LEFT SPILLWAY WALL. NOTE OUTWARD
MOVEMENT OF TOP OF WALL.

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CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

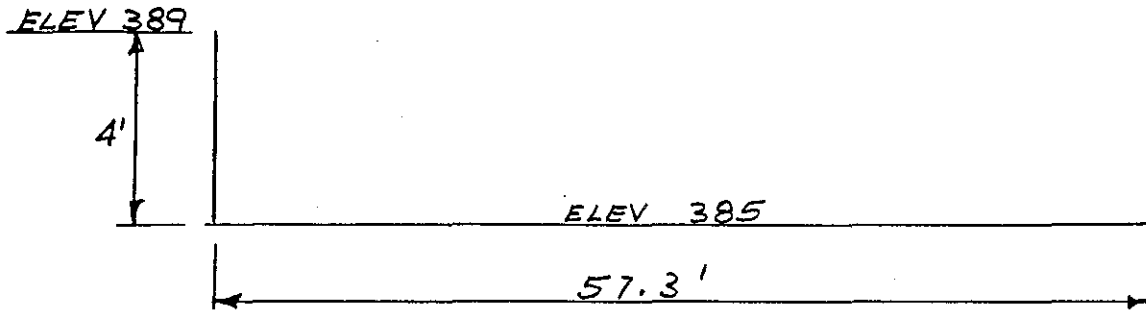
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BIRGE POND DAM
BIRGE POND BROOK
BRISTOL, CONNECTICUT
CT 00007
19 APRIL '80

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Appendix C
Hydrologic Computations

BY SAL DATE 5/14/80 SHEET NO. 1 OF 5
CKD BY DLS DATE 5/22/80 JOB NO. 49-015
SUBJECT BIRGE POND DAM - Spillway Capacity



FREEBOARD = 4 ft

DISCHARGE COEFFICIENT = 2.6 (for a 20 foot broad-crested weir)

$$\begin{aligned}\text{Spillway Discharge Capacity} &= CLH^{3/2} \\ &= 2.6(57.3)(4)^{3/2} \\ &= 1,190 \text{ cfs}\end{aligned}$$

S = Storage at time of failure = Storage at spillway level + Freeboard Storage

$$S = (20 \times 10^6 \text{ gal} \times 1 \text{ ac-ft} / 325,851 \text{ gal}) + (11 \text{ acres} \times 4 \text{ ft}) = 105 \text{ ac-ft}$$

Note: The 20MGD storage capacity at spillway was obtained from an inspection report by Clairance Blair Associates dated March 20, 1963.

$$Q_{P1} = \text{Peak Failure Outflow} = 8/27 W_b \sqrt{g} Y_0^{3/2}$$

W_b = Breach Width - 40% of dam length across river at mid height = $0.4(133) = 53$

Y_0 = Total height from river bed to pool level at time of failure = 16 ft

$$Q_{P1} = 8/27 (53) (\sqrt{32.2}) (16)^{3/2} = 5703 \text{ cfs}$$

SECTION NO 1 (Railroad Embankment)

$$Q_{P1} = 5703 \text{ cfs}$$

The embankment will act like a flood control dam with downstream discharge being controlled by the discharge capacity of a 7' diameter stone masonry culvert.

Assume $H = 18'$

$$Q_{P2} = 700 \text{ cfs}$$

Storage in reach = 53 ac-ft

Backwater from railroad culvert would be about Elev 385 equal to the spillway level of the dam.

BY...SA/.....DATE 5/1/80

ROAL HAESTAD, INC.

SHEET NO. 3 OF 5

CONSULTING ENGINEERS

CKD BY DLS DATE 5/9/80

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. 049-15

SUBJECT BIRGE POND DAM - Storage Capacity

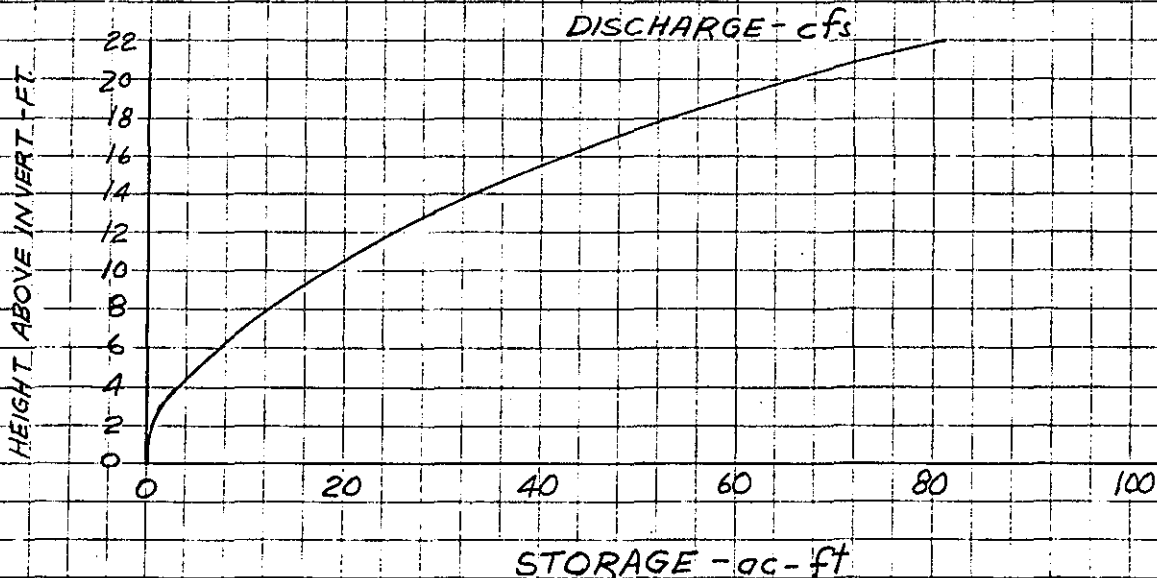
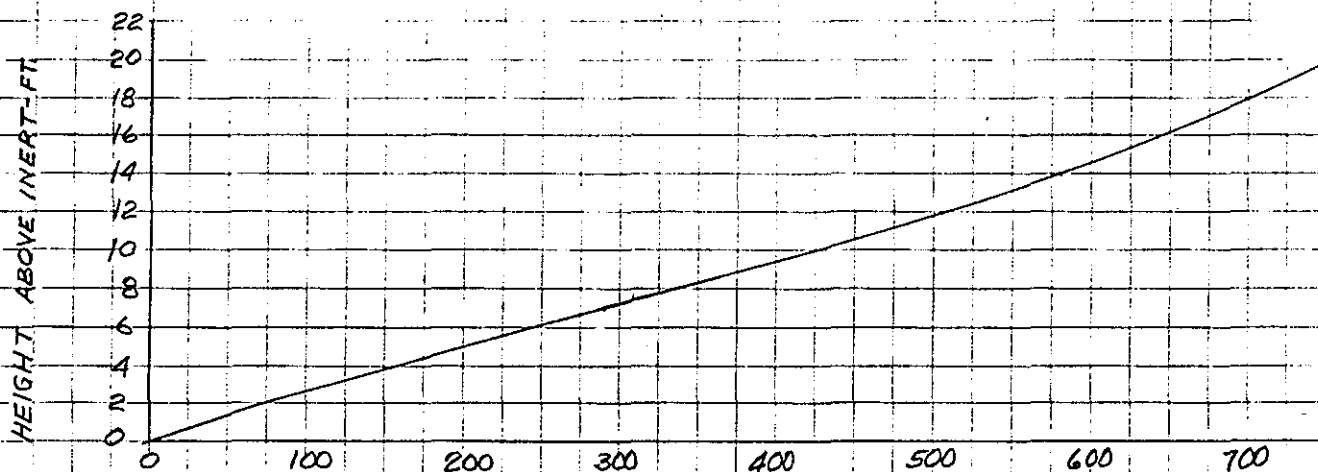
Storage between Dam and Railroad Embankment.

Elevation (feet)	Surface Area (acres)	Average Surface Area (acres)	Storage Capacity (acres - ft)
367	0		0
		0.45	
370	0.9		1.4
		2.75	
380	4.6		28.9
		5.95	
390	7.3		88.4

SECTION NO 1 (Railroad Embankment)

- 1) Conduit is a 7' diam. stone masonry (Assume Inlet Control)
- 2) Invert is approx. at Elev. 367
- 3) Top of railroad embankment is Elev. 400.

Elev. (ft)	HW (ft)	HW/D (ft/ft)	Q (cfs)
367	0	0	0
374	7	1	290
381	14	2	580
388	21	3	780
395	28	4	920
400	33	4.7	1,000



BY SAL DATE 5/14/80 **ROALD HAESTAD, INC.** SHEET NO. 5 OF 5
CONSULTING ENGINEERS
CKD BY DL3 DATE 7/16/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-015
SUBJECT BIRGE POND DAM - Surface Areas

Planimeter Readings:

1) Surface Area: Third = 0.60 sq in 0.12
First = 0.36 sq in 0.13
Start = 0.23

$$\frac{0.12 \text{ in}^2 \times (2000 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 11 \text{ acres}$$

2) Watershed: Third = 8.00 2.51 x 4 = 10.04 in²
First = 2.97 2.51 (Note: 4 is a factor to convert
Start = 0.46 planimeter readings into sq in)

$$\frac{10.04 \text{ in}^2 \times (2000 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ sq mi}}{(5,280 \text{ ft})^2} = 1.44 \text{ sq mi}$$

Surface area between dam and railroad embankment.

3) Contour 370: Third = 0.16 sq in 0.01
First = 0.15 sq in 0.01
Start = 0.14 sq in

$$\frac{0.01 \text{ in}^2 \times (2000 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 0.92 \text{ acres}$$

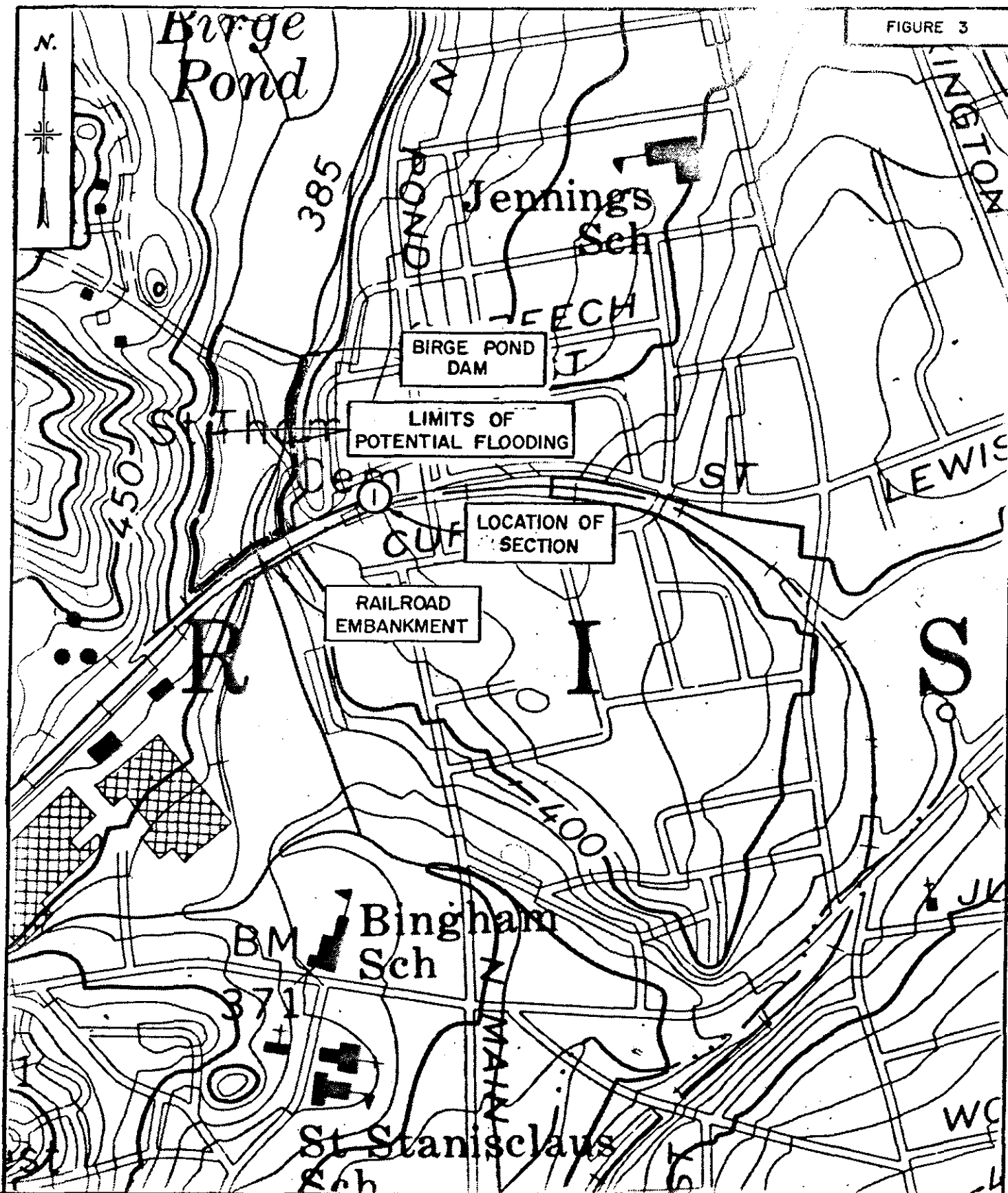
4) Contour 380: Third = 0.44 sq in 0.05
First = 0.34 sq in 0.06
Start = 0.28 sq in

$$\frac{0.05 \text{ in}^2 \times (2000 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 4.6 \text{ acres}$$

5) Contour 390: Third = 0.47 sq in 0.08
First = 0.32 sq in 0.08
Start = 0.24 sq in

$$\frac{0.08 \text{ in}^2 \times (2000 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 7.3 \text{ acres}$$

FIGURE 3



LIMITS OF POTENTIAL FLOODING

BIRGE POND DAM

BRISTOL, CONNECTICUT

SCALE: 1" = 500'